CLAIMS

What is claimed is:

1. An optical recording medium recording, erasing, and reproducing data, comprising a recording layer having a specific zone in which additional recording information, including power information for high-speed recording of a recording pattern for data recording.

2. The optical recording medium of claim 1wherein the power information indicates that a recording pattern is formed of a recording multi-pulse train including a first pulse, a multi-pulse train and/or a last pulse, wherein the recording multi-pulse train has high and low write power levels, and the low write power level is set to be higher than a bias power level.

3. The optical recording medium of claim 2, wherein an erasure pattern formed of an erase multi-pulse train for data erasure is recorded, and the power information indicates that the erase multi-pulse train has high and low erase power levels and the low erase power level is set to be equal to a predetermined DC level of a general erase power, and the high erase power level is equal to the predetermined DC level, or the predetermined DC level is between the high erase power level and the low erase power level.

4. The optical recording medium of claim 3, wherein a ratio of a time duration of the last pulse to a time duration of the multi-pulse train has a predetermined range with respect to a range of jitter allowable by a system.

5. The optical recording medium of claim 4, wherein when the range of jitter allowable by the system is 7%, the ratio of the time duration of the last pulse to the time duration of the multi-pulse train ranges from 0.9 to 1.3.

6. The optical recording medium of claim 4, wherein when the range of jitter allowable by the system is 8%, the ratio of the time duration of the last pulse to the time duration of the multi-pulse train ranges from 0.7 to 1.4.

7. The optical recording medium of claim 3, wherein s minimum cooling time duration of the last pulse depends on the range of jitter allowable by a system, and a maximum cooling time duration of the last pulse depends on a length of a minimum recorded mark.

8. The optical recording medium of claim 7, wherein the cooling time duration of the last pulse of the recording pattern is set to the length of the minimum recorded mark.

9. The optical recording medium of claim 2, wherein a power for the erasure pattern for data erasure has a predetermined DC level.

10. The optical recording medium of claim 9, wherein a ratio of a time duration of the last pulse to a time duration of the multi-pulse train has a predetermined range with respect to a range of jitter allowable by a system.

11. The optical recording medium of claim 10, wherein when the range of jitter allowable by the system is 7%, the ratio of the time duration of the last pulse to the time duration of the multi-pulse train ranges from 0.9 to 1.3.

12. The optical recording medium of claim 10, wherein when the range of jitter allowable by a system is 8%, the ratio of the time duration of the last pulse to the time duration of multi-pulse train ranges from 0.7 to 1.4.

13. The optical recording medium of claim 9, wherein the minimum cooling time duration of the last pulse depends on the range of jitter allowable by a system, and the maximum cooling time duration of the last pulse depends on a length of a minimum recorded mark.

14. The optical recording medium of claim 7, wherein the cooling time duration of the last pulse of the recording pattern is set to the length of the minimum recorded mark.

15. The optical recording medium of claim 1, wherein erasure pattern information including information about a power level of a first pulse of the erasure pattern and a power level of a last pulse of the erasure pattern is further recorded to the specific zone of the recording layer.

16. The optical recording medium of claim 15, wherein power levels of a first pulse and a last pulse forming the erasure pattern are recorded as one of 4 types, including a first type where power levels of the first pulse and last pulse are equal to a high erase power level, a second type where the power level of the first pulse is equal to a low erase power level and the power level of the last pulse is equal to the high erase power level, a third type where the power level of the first pulse is equal to the high erase power level and the power level of the last pulse is equal to the low erase power level, and a fourth type where the power levels of the first pulse and last pulse are equal to the low erase power level.

17. A method of recording data onto an optical recording medium, the method comprising:

generating a recording waveform having a recording pattern for high-speed recording; and

forming a first level of the data as a mark and a second level of the data as a space, using the generated recording waveform.

18. The method of claim 17, wherein the recording pattern is formed of recording multi-pulse trains including a first pulse, a multi-pulse train, and/or a last pulse, wherein power levels of the recording multi-pulse trains are equal to a high or low write power level, and a low write power level is higher than a bias power level for a last pulse of the recording multi-pulse trains.

19. The method of claim 18, wherein a power for an erasure pattern for data erasure has a predetermined DC level.

20. The method of claim 18, wherein a ratio of a time duration of the last pulse to a time duration of the multi-pulse train has a predetermined range with respect to a range of jitter allowable by a system.

21. A method of recording data onto an optical recording medium, the method comprising:

generating a recording waveform having a recording pattern and an erasure pattern with a multi-pulse train for high-speed recording; and

forming a first level of the data as a mark and a second level of the data as a space, using the generated recording waveform.

22. The method of claim 21 wherein the recording pattern is formed of a recording multi-pulse train including a first pulse, a multi-pulse train, and/or a last pulse, wherein power levels of the recording multi-pulse train are equal to a high or low write power level, and a low write power level is higher than a bias power level for a last pulse of the recording multi-pulse train.

23. The method of claim 22, wherein time periods of the recording multi-pulse train are controlled with respect to a timing window Tw within a range of 0.25 – 2.0Tw.

24. The method of claim 23, wherein time periods of the recording multi-pulse train are equal to 1.0Tw.

25. The method of claim 23, wherein time periods of the recording multi-pulse train are equal to 2.0Tw.

26. The method of claim 22, wherein power levels of the multi-pulse train constituting the erasure pattern periodically change between at least two levels, a high erase power level Ppe and a low erase power level Pbe.

27. The method of claim 22, wherein a ratio of the time duration of the last pulse to a time duration of the multi-pulse train has a predetermined range with respect to a range of jitter allowable by a system.

28. The method of claim 22, wherein a minimum cooling time duration of the last pulse depends on the range of jitter allowable by a system, and a maximum cooling time duration of the last pulse depends on a length of a minimum recorded mark.

29. The method of claim 27, wherein the cooling time duration of the last pulse of the recording pattern is set to the length of the minimum recorded mark.

30. The method of claim 22, further comprising write power information about the generated recording waveform at a specific zone of a recording layer.

31. An apparatus for recording data onto an optical recording medium, the apparatus comprising:

a recording waveform generating circuit, which generates a recording waveform having a recording pattern for high-speed recording of the data; and

a pickup unit, which forms a mark or space by irradiating light onto the optical recording medium according to the generated recording waveform to record the data.

32. The apparatus of claim 31, wherein the recording pattern is formed of a recording multi-pulse train including a first pulse, a multi-pulse train, and/or a last pulse, wherein power levels of the recording multi-pulse train are equal to a high or low write power level, and a low write power level is higher than a bias power level for a last pulse of the recording multi-pulse train.

33. The apparatus of claim 32, wherein the recording waveform further comprises an erasure pattern formed of an erase multi-pulse train for data erasure, and the erase multi-pulse train has a high erase power level and a low erase power level and a low erase power level Pbe is set to be equal to a predetermined DC level of a general erase power, a high erase power level Ppe is set to be equal to the predetermined DC level, or the predetermined DC level is set between the high erase power level Ppe and the low erase power level Pbe.

34. The apparatus of claim 33, wherein a ratio of a time duration of the last pulse to a time duration of the multi-pulse train has a predetermined range with respect to a range of jitter allowable by a system.

35. The apparatus of claim 33, wherein a minimum cooling time duration of the last pulse depends on a range of jitter allowable by a system, and a maximum cooling time duration of the last pulse depends on a length of a minimum recorded mark.

36. The apparatus of claim 35, wherein the cooling time duration of the last pulse of the recording pattern is set to the length of the minimum recorded mark.

37. The apparatus of claim 32, wherein a power for the erasure pattern for data erasure has a predetermined DC level.

38. The apparatus of claim 37, wherein a ratio of the time duration of the last pulse to the time duration of the multi-pulse train has a predetermined range with respect to a range of jitter allowable by a system.

39. An optical recording medium comprising a recording layer wherein a low level of a write power for recording a pattern is set to be higher than a bias power level when data is recorded.

40. An optical recording medium comprising a recording layer wherein shapes of leading and trailing parts of a mark are prevented from being distorted by applying an erase power level to the optical recording medium in the shape of a pulse.

41. An optical recording medium comprising a recording layer wherein time durations of high and low levels of an erase power are controlled with respect to a timing window Tw having a range of 0.25 to 2.0 Tw, and data is recorded onto the optical recording medium while selecting time durations of high and low levels of the erase power suitable for thermal characteristics of the optical recording medium.

42. An optical recording medium comprising a recording layer wherein when time periods of recording multi-pulse trains and erase multi-pulse trains are equal to 2.0Tw, respectively, a quality marked is formed by increasing an amount of incident light on the optical recording medium, without increasing a write power and an erase power.